## REMARKS

Claims 1 – 4 and 6-9 are pending in the present application. No Amendments have been made. It is respectfully submitted that this Response is fully responsive to the Office Action dated December 9 2005.

### Claim Objections:

Claims 1-4 and 6-9 stand objected to in item 2 of the Action.

However, it is respectfully submitted that the objection to the claimed phrase, "regular polynomial figures," should be withdrawn because that phrase is repeatedly mentioned in the Preferred Embodiments section of the Specification beginning on page 41. It is mentioned twice on the first page of the Preferred Embodiments section and a total of 10 times in that section all together, thereby supporting the use of that phrase in the claims.

Moreover, it is respectfully submitted that the word "regular" before the phrase "N-polynomial figure," is descriptive with respect to describing a polynomial figure with sides equal in length, thus adding to the understanding of the present invention. Accordingly, withdrawal of this objection is respectfully requested.

## Claim Rejections - 35 U.S.C. § 112 (first paragraph) – Enablement Requirement

Claims 3 and 8 are rejected under 35 U.S.C. § 112 (first paragraph) as failing to comply with the enablement requirement. The claim(s) contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

This rejection is respectfully traversed.

The Examiner contends that the methodology of forming an (N+1) polygonal figure is not disclosed in the drawings or specification section of the application. The Examiner states that "no algorithms, techniques or flow charts are disclosed." However, beginning on page 15 of the specification, line 25, the enablement of the (N+1) embodiment is disclosed. On page 16, lines 6-9 the Constructional Elements of the Invention read:

> inputting so as to revolve a regular (N+1) polygonal figure along a circle, which circle is concentric to the center of a regular N-polygonal figure to be determined and has a radius r.

The Constructional Elements of the Invention section then continue to explain how to enable the present invention, based largely on the same analysis set forth in the previous embodiment (B).

Additionally, directly addressing the Examiner's concerns, the (N+1) embodiment is described beginning on page 47, line 4. The (N+1) embodiment description describes figures 22-25. Figures 22-25 use a pentagon (where N = 5) to cut out a "square" (where N = 4).

Furthermore, the flowchart in figure 53 discloses an algorithm for determining an appropriate geometric figure. The second step in the flow chart process, (S2), specifically seeks to determine which scheme is to be used; scheme (A), scheme (B), or scheme (C) (the N+1 scheme).

Given the aforementioned arguments, it is submitted that one skilled in the art could make and/or use the claimed invention without undue experimentation, and therefore the rejection should be withdrawn.

## Claim Rejections - 35 U.S.C. § 112 (first paragraph) – Written Description Requirement

Claims 3 and 8 are rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. This rejection is respectfully traversed.

As discussed above with regard to the enablement requirement, the methodology of

forming an (N+1) polygonal figure is clearly disclosed in present specification as originally filed.

As such, it is respectfully submitted that at the time the application was filed, the application had

possession of the claimed invention as set forth in claims 3 and 8. Accordingly, withdrawal of

this rejection is respectfully traversed.

## Claim Rejections - 35 U.S.C. § 112 Second Paragraph:

Claims 3 and 8 are rejected under 35 U.S.C. § 112, second paragraph, as failing to set

forth the subject matter which applicants regard as their invention. This rejection is respectfully

traversed.

The Examiner contends that the term, "forming an N-polygonal figure using an (N+1)

figure," is vague and indefinite since the term is not defined by the claim, and "one of ordinary

skill in the art would not be reasonably apprised of the scope of the invention."

It is submitted that the term, "forming an N-polygonal figure using an (N+1) figure," is

not vague or indefinite, and is self-explanatory. The letter 'N,' commonly used in a variety of

mathematics including geometry, stands for any real number. A "polygon" is defined as, "a

closed plane figure bounded by straight lines" (Webster's Online Dictionary, http://www.m-

w.com/dictionary/polygon). Therefore an "N-polygonal figure" would mean a polygon having

"N" number of sides or vertices. The phrase, "forming an N-polygonal figure using an (N+1) figure," therefore means; for example, forming a square (N = 4) by using a pentagon (N=5) to carve it out, or forming a triangle (N = 3) by using a square (N = 4) to carve it out.

Accordingly, withdrawal of the rejection of claims 3 and 8 under 35 U.S.C. § 112, second paragraph, is requested due to the self-explanatory nature of the phrase "forming an N-polygonal figure using an (N+1) figure."

## Claim Rejections - 35 U.S.C. § 103(a)

Claims 1-4 and 6-9 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kimura (JP 406304805) in view of Little (Dr. David Little, SpiroGraph, http://www.math.dartmouth.edu/~dlittle/java/SpiroGraph/, 1997). T

This rejection is respectfully traversed.

## Independent Claim 1:

In the invention of amended claim 1, such features are as follows:

1-(1) "the second point (M) is away from the first point (E) by a distance $(N-1)^2 r$";

1-(2) "the locus of the second point (M) defines a contour of a regular N-polygonal figure to be determined being circumscribed on a circle having a radius $N(N-2)r$";

1-(3) "the contour of the regular N-polygonal figure can be defined by a function f( $\theta$ )";

1-(4) "the function f( $\theta$ ) is a one-valued function; the function f( $\theta$ ) is a periodic function with a period 2 $\pi$ /N",

1-(5) "the function f( $\theta$ ) has one maximum value and one minimum value in one period";

1-(6) "the function f( $\theta$ ) has line symmetry with respect to the center of the minimum point between the two maximum points, in regard to one period from a maximum point to the next maximum point of the function f( $\theta$ )"; and

1-(7) "the function f( $\theta$ ) has a positive curvature or no curvature".

It appears that the examiner insists that the above-mentioned features 1-(1) and 1-(2) are suggested in the area "Rounded Square" in Little.

However, conditions shown in the area "Rounded Square", that is, Radius 1 is 60, Radius 2 is –45, Position is –101 and Resolution is 270 do not correspond to the above-mentioned features 1-(1) and 1-(2).

Additionally, in the specification of the present application, there is not a description relating to the parameter "Resolution" written in Little. Therefore, it is obvious that the mechanism of the invention of the claim 1 is different from the mechanism of Little.

Moreover, it is impossible for the skilled in the art to introduce the above-mentioned features 1-(1) to 1-(7) from the formulas written in <u>Little</u> which define a "cycloid".

Especially, since <u>Little</u> does <u>not</u> indicate that the contour of the regular N-polygonal figure can be defined by a function, nobody could introduce the features 1-(3) to 1-(7) from <u>Little</u>.

Also, <u>Kimura</u> (JP 06304805 A) does <u>not</u> indicate the above-mentioned features 1-(1) to 1-(7).

Therefore, it is impossible for the skilled in the art to create the invention of amended claim 1 from <u>Little</u> and <u>Kimura</u>.

<u>Independent Claim 2:</u>

In the invention of the amended claim 2, there are constructional elements as follows;

2-(1) "a contour of the said regular (N-1)-polygonal figure is inscribed on a circle having a radius $(N-1)^2 r$";

2-(2) "the regular (N-1)-polygonal figure revolves at an angular velocity $(1-N)\omega$";

2-(3) "an area being swept by the said regular (N-1)-polygonal figure defines a regular N-polygonal figure to be determined, which figure is circumscribed on a circle having a radius N(N-2)r"; and

the above-mentioned constructional elements 1-(3) to 1-(7).

In Little and Kimura, there are no descriptions which suggest the constructional elements 2-(1) to 2-(3) and 1-(3) to 1-(7).

Since Little does not indicate that the contour of the regular N-polygonal figure can be defined by a function, nobody could introduce the features 1-(3) to 1-(7) from Little.

It appears that the examiner insists that the above-mentioned features 2-(1) to 2-(3) are suggested in the area "Rounded Square" in Little.

However, conditions shown in the area "Rounded Square", that is, Radius 1 is 60, Radius 2 is –45, Position is –101 and Resolution is 270 do not correspond to the above-mentioned features 2-(1) to 2-(3).

Additionally, in the specification of the present application, there is <u>not</u> a description relating to the parameter "Resolution" written in <u>Little</u>. Then, it is obvious that the mechanism of the invention of the claim 1 is different from the mechanism of <u>Little</u>.

Therefore, it is impossible for the skilled in the art to create the invention of amended claim 2 from <u>Little</u> and <u>Kimura</u>.

Independent Claim 3:

In the invention of the amended claim 3, there are constructional elements as follows;

3-(1) "a regular (N+1)-polygonal figure revolves along a circle, which circle is concentric to the center of a regular N-polygonal figure to be determined and has a radius r, and rotates at an angular velocity $\omega$ ";

3-(2) "a contour of the said regular (N+1)-polygonal figure is inscribed on a circle having a radius $(N+1)^2 r$ ";

3-(3) "the regular (N+1)-polygonal figure revolves at an angular velocity $(N+1)\omega$ ";

3-(4) "an area being swept by the said regular (N+1)-polygonal figure defines a regular N-polygonal figure to be determined, which figure is circumscribed on a circle having a radius N(N+2)r"; and

the above-mentioned constructional elements 1-(3) to 1-(7).

In <u>Little</u> and <u>Kimura</u>, there are no descriptions which suggest the constructional elements

3-(1) to 3-(4) and 1-(3) to 1-(7).

Since <u>Little</u> does <u>not</u> indicate that the contour of the regular N-polygonal figure can be

defined by a function, nobody could introduce the features 1-(3) to 1-(7) from <u>Little</u>.

<u>Kimura</u> does <u>not</u> indicate a method for determining a regular N-polygonal figure by

means of a regular (N+1)-polygonal figure.

It appears that the examiner insists that the above-mentioned features 3-(1) to 3-(4) are

suggested in the area "Rounded Square" in <u>Little</u>.

However, conditions shown in the area "Rounded Square", that is, Radius 1 is 60, Radius

2 is –45, Position is –101 and Resolution is 270 do <u>not</u> correspond to the above-mentioned

features 3-(1) to 3-(4).

Additionally, in the specification of the present application, there is <u>not</u> a description

relating to the parameter "Resolution" written in <u>Little</u>.  Therefore, it is obvious that the

mechanism of the invention of the claim 3 is different from the mechanism of <u>Little</u>.

It is impossible for the skilled in the art to create the invention of amended claim 3 from

Little and Kimura.

Independent Claim 4:

In the invention of the amended claim 4, there are constructional elements as follows;

4-(1) "setting a ratio of the distance between the center point and the first point to the

length of a line segment connecting the first and second points being smaller than $(N-1)^2$";

4-(2) "defining a figure to be determined by the locus of the second point, which figure

has vertexes of N in number, is circumscribed on a circle having a radius $N(N-2)r$, and is a single

closed region formed by curves"; and

the above-mentioned constructional elements 1-(3) to 1-(7).

In Little and Kimura, there are no descriptions which suggest the constructional elements

4-(1) and 4-(2) and 1-(3) to 1-(7).

Since Little does not indicate that the contour of the regular N-polygonal figure can be

defined by a function, nobody could introduce the features 1-(3) to 1-(7) from Little.

It appears that the examiner insists that the above-mentioned limitations 4-(1) and 4-(2)

are suggested in the area "Rounded Square" in Little.

However, conditions shown in the area "Rounded Square", that is, Radius 1 is 60, Radius 2 is −45, Position is −101 and Resolution is 270 do not correspond to the above-mentioned features 4-(1) and 4-(2).

Additionally, in the specification of the present application, there is not a description relating to the parameter "Resolution" written in Little. Therefore, it is obvious that the mechanism of the invention of the claim 1 is different from the mechanism of Little.

It is impossible for the skilled in the art to create the invention of amended claim 4 from Little and Kimura.

Independent Claim 6:

In the invention of the amended claim 6, there are constructional elements as follows;

6-(1) "the said input means is constructed to carry out functions for" "setting a distance $(N-1)^2 r$ between the second point and the first point";

6-(2) "said control means is constructed so as to carry out functions for defining a regular N-polygonal figure to be determined by the locus of the second point, which figure is circumscribed on a circle having a radius $N(N-2)r$"; and

the above-mentioned constructional elements 1-(3) to 1-(7).

In <u>Little</u> and <u>Kimura</u>, there are <u>no</u> descriptions which suggest the constructional elements 6-(1) and 6-(2) and 1-(3) to 1-(7).

Since <u>Little</u> does not indicate that the contour of the regular N-polygonal figure can be defined by a function, nobody could introduce the features 1-(3) to 1-(7) from <u>Little</u>.

It appears that the examiner insists that the above-mentioned features 6-(1)and 6-(2) are suggested in the area "Rounded Square" in <u>Little</u>.

However, conditions shown in the area "Rounded Square", that is, Radius 1 is 60, Radius 2 is –45, Position is –101 and Resolution is 270 do not correspond to the above-mentioned featrues 6-(1)and 6-(2).

Additionally, in the specification of the present application, there is <u>not</u> a description relating to the parameter "Resolution" written in <u>Little</u>. Therefore, it is obvious that the mechanism of the invention of the claim 6 is different from the mechanism of <u>Little</u>.

It is impossible for the skilled in the art to create the invention of amended claim 6 from <u>Little</u> and <u>Kimura</u>.

Independent Claim 7:

In the invention of the amended claim 7, there are constructional elements as follows;

7-(1) "said input means is constructed to carry out functions for"" setting the regular (N-1)-polygonal figure so as to define a contour which is inscribed on a circle having a radius (N-1)$^2$r";

7-(2) "setting an angular velocity (1-N)$\omega$ at which the regular (N-1)-polygonal figure revolves";

7-(3) "said control means is constructed to carry out a function for defining a regular N-polygonal figure to be determined, which is circumscribed on a circle having a radius N(N-2)r, by an area being swept by the regular (N-1)-polygonal figure"; and

the above-mentioned constructional elements 1-(3) to 1-(7).

In Little and Kimura, there are no descriptions which suggest the constructional elements 7-(1) to 7-(3) and 1-(3) to 1-(7).

Since Little does not indicate that the contour of the regular N-polygonal figure can be defined by a function, nobody could introduce the features 1-(3) to 1-(7) from Little.

It appears that the examiner insists that the above-mentioned features 7-(1) to 7-(3) are suggested in the area "Rounded Square" in Little.

However, conditions shown in the area "Rounded Square", that is, Radius 1 is 60, Radius 2 is –45, Position is –101 and Resolution is 270 do not correspond to the above-mentioned features 7-(1) to 7-(3).

Additionally, in the specification of the present application, there is not a description relating to the parameter "Resolution" written in Little.    It is obvious that the mechanism of the invention of the claim 7 is different from the mechanism of Little.

Therefore, it is impossible for the skilled in the art to create the invention of amended claim 7 from Little and Kimura.

Independent Claim 8:

In the invention of the amended claim 8, there are constructional elements as follows;

8-(1) "the said input means is constructed to carry out functions for'"" setting the regular (N+1)-polygonal figure so as to define a contour which is inscribed on a circle having a radius $(N+1)^2r$";

8-(2) "setting an angular velocity $(N+1)\omega$ at which the regular (N+1)-polygonal figure revolves";

8-(3) "said control means is constructed to carry out a function for defining a regular N-polygonal figure to be determined, which is circumscribed on a circle having a radius $N(N+2)r$, by an area being swept by the regular $(N+1)$-polygonal figure"; and

the above-mentioned constructional elements 1-(3) to 1-(7).

In <u>Little</u> and <u>Kimura</u>, there are <u>no</u> descriptions which suggest the constructional elements 8-(1) to 8-(3) and 1-(3) to 1-(7).

Since <u>Little</u> does <u>not</u> indicate that the contour of the regular N-polygonal figure can be defined by a function, nobody could introduce the features 1-(3) to 1-(7) from <u>Little</u>.

It seems the examiner insisted that the above-mentioned features 8-(1) to 8-(3) are suggested in the area "Rounded Square" in <u>Little</u>.

However, conditions shown in the area "Rounded Square", that is, Radius 1 is 60, Radius 2 is –45, Position is –101 and Resolution is 270 do <u>not</u> correspond to the above-mentioned features 8-(1) to 8-(3).

Additionally, in the specification of the present application, there is <u>not</u> a description relating to the parameter "Resolution" written in <u>Little</u>. It is obvious that the mechanism of the invention of the claim 8 is different from the mechanism of <u>Little</u>.

<u>Kimura</u> does <u>not</u> indicate a method for determining a regular N-polygonal figure by means of a regular (N+1)-polygonal figure.

Therefore, it is impossible for the skilled in the art to create the invention of amended claim 8 from <u>Little</u> and <u>Kimura</u>.

<u>Independent Claim 9</u>:

In the invention of the amended claim 9, there are constructional elements as follows;

9-(1) "said input means is constructed to carry out functions for" "setting a ratio of the distance between the center point and the first point to the length of a line segment, which connects the first and second points, being smaller than $(N-1)^2$";

9-(2) "said control means is constructed to carry out a function for defining a figure to be determined by the locus of the second point, which figure has vertexes of N in number, is circumscribed on a circle having a radius N(N-2)r, and is a single closed region formed by curves"; and

the above-mentioned constructional elements 1-(3) to 1-(7).

In <u>Little</u> and <u>Kimura</u>, there are <u>no</u> descriptions which suggest the constructional elements 9-(1) and 9-(2) and 1-(3) to 1-(7).

Since <u>Little</u> does <u>not</u> indicate that the contour of the regular N-polygonal figure can be defined by a function, nobody could introduce the features 1-(3) to 1-(7) from <u>Little</u>.

It appears that the examiner insists that the above-mentioned features 9-(1) and 9-(2) are suggested in the area "Rounded Square" in <u>Little</u>.

However, conditions shown in the area "Rounded Square", that is, Radius 1 is 60, Radius 2 is –45, Position is –101 and Resolution is 270 do not correspond to the above-mentioned features 9-(1) and 9-(2).

Additionally, in the specification of the present application, there is <u>not</u> a description relating to the parameter "Resolution" written in <u>Little</u>. It is obvious that the mechanism of the invention of the claim 9 is different from the mechanism of <u>Little</u>.

Therefore, it is impossible for the skilled in the art to create the invention of amended claim 9 from <u>Little</u> and <u>Kimura</u>.

## Examiner's Response to Applicant's Arguments

It is submitted that the Examiner has minimally responded to the applicant's arguments in regard as to why the previous claim rejections were inappropriate. After the applicant's detailed 28 page response to the Examiner's claim rejections, the Examiner has set forth a one paragraph reply as to why applicant's response was not persuasive. It will be noted that the Examiner is asserting his reply in response to the 35 U.S.C. § 102 claim rejections. It is believed that this is a mistake, and that the Examiner meant his reply to be against the 35 U.S.C. § 103 claim rejections.

More specifically, in his response to the applicant's arguments, the Examiner explicitly disagreed only with the one listed on page 16, lines 1-3 and stated that, "The Little reference teaches a tool for forming any different kind of polygon by the combinations of different R1, and R2 Positions." The Examiner then asserted his previous position that the $(N-1)^2 r$ limitation was previously disclosed by <u>Little</u>. It is submitted that the Examiner's one paragraph reply to the applicant's 28 page detailed response was inadequate in every respect. As stated in the previous response, the <u>Little</u> reference has little or no bearing on the present invention.

In addition, it is submitted from the abstract and figures 2 through 12, that <u>Kimura</u> discloses using a triangle to bore a square hole. That is, using the vertices of a <u>triangle</u> as the

cutting edge, is the only way that Kimura bores a square hole. The present invention however, in the preamble of the claims, teaches a "method/apparatus for determining a regular N-polygonal figure for a boring hole having vertexes of N in number...." In other words, the present invention teaches a way to determine the shape of the tool that bores the hole.

Kimura does not teach how to determine the appropriate shape of the cutting tool used to bore the hole since the only shape disclosed is that of a triangle. Kimura discloses how to bore a square hole using a triangle, whereas the present invention, among other things, teaches how to ascertain the appropriate shaped cutting tool in order to bore a polygonal hole.

In addition to the above mentioned arguments, the present invention calls for teaching an N-polygonal figure using a "regular (N + 1) polygonal figure," (claims 3 and 8). Little however, only teaches how to form shapes (polygonal and otherwise), using two circles, as shown on the website. Kimura also does not disclose this feature. Kimura only discloses using a triangle to bore a square. Therefore, forming an N polygonal figure using a "regular (N + 1) polygonal figure" is an element of claims 3 and 8 that is not taught or fairly suggested by Kimura or Little.

Therefore, given the preceding arguments, along with the arguments set forth in the previous response, no matter how Kimura is combined with Little, it would not be obvious for one of ordinary skill in the art to achieve the present claimed invention.
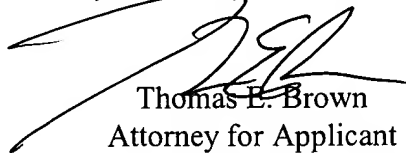
In view of the aforementioned remarks, Applicant submits that that the claims are in condition for allowance. Applicant requests such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicant's undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicant respectfully petitions for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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